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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Ashok Kumar Gupta

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EXAMINER

CUTLIFF, YATE KAI RENE

ART UNIT

PAPER NUMBER

1621

MAIL DATE

DELIVERY MODE

04/01/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/585,041	Applicant(s) GUPTA ET AL.	
	Examiner YATE' K. CUTLIFF	Art Unit 1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. Claims 1 – 4 and 6 – 12 are pending.

Claim 5 have been canceled

Claims 1 – 4 and 6 – 12 are rejected.

Response to Amendment

2. The amendment to claims 1 – 4, and 6, and new claim 12, submitted December 22, 2008 is acknowledged and entered.

Response to Arguments

3. Applicant's arguments, see 5, filed December 22, 2008; with respect to the objection of claim 1 has been fully considered and is persuasive in view of the amendment. The objection of claim 1 has been withdrawn.

4. Applicant's arguments, see page 5, filed December 22, 2008, with respect to the 35 U.S.C. 112 second paragraph rejection of claim 3 has been fully considered and are persuasive in view of the amendment. The 35 U.S.C. 112 second paragraph rejection of claim 3 has been withdrawn.

5. Applicant's arguments with respect to claims 1- 4 and 6-11 have been considered but are moot in view of the new ground(s) of rejection as set out below.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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7. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 1 recites the limitation "the excess alcohol" in line 14. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1-4 and 6 – 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoo, (US 2005/0080280 corresponds to WO 03//066567) in view of Hayafuji et al. (US 5,972,057); in view of Yean et al. (Applied Organometallic Chemistry, 2000, vol. 14); and further in view of Caiudelli (US 4,567,037).

13. The rejected claims cover, inter alia, a process for preparing fatty acid alkyl esters suitable for use as biodiesel from a starting material of fatty acid glycerides selected from the group consisting of vegetable oils, animal oils, fats and, fatty acids and a mixture thereof wherein esterification of the fatty acid and transesterification of the triglycerides is carried out simultaneously, said process comprises the steps of:

a) reacting fatty acid glycerides and fatty acid present in it with an alcohol having 1-4 carbon atoms in a molar ratio of 3:1 to 30:1 of fatty acids to triglycerides respectively, at a temperature ranging between 70-300°C, pressure in a range of 1-30 bar, in presence of a organometallic catalytic compound of tin wherein the concentration of catalyst is in a range of 0.01 to 3 weight percent of the fatty acid glycerides; b) obtaining fatty acid alkyl esters with glycerol; c) separating the glycerol from the fatty acid alkyl esters ester as immiscible phase by decantation; d) recovering and recycling the excess alcohol by evaporation or distillation; e) purifying the fatty acid alkyl esters by washing with water, and f) purifying the washed ester obtained in step e) by treating with a basic adsorbent to obtain biodiesel by distillation process or combinations thereof. The dependent claims identify the fatty acid glycerides, absorbent, catalyst and temperature range of

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reaction and purification. Further, the dependent claims set out the acid value and viscosity level of the obtained product and uses for the product produced.

14. Yoo discloses a process for producing fatty acid alkyl esters in a single-phase one step continuous process for the preparation of alkyl esters of fatty acids where the feed stock is from animal fat and/or vegetable oil. The process involves the following steps and with the reaction being between animal fat and/or vegetable oil and a lower alcohol (C1-C4) with a tin-type catalyst. The reaction mechanism: 1) alkali catalyst is linked to ester group of fat and/or oil, which is relatively more acidic than the lower alcohol, to give an intermediate with increased reactivity; and, 2) transesterification between alcohol and reactive ester group of oil is followed. (see para. [0044]). One of the catalysts that may be use in the reaction is an organometallic catalytic compound of Tin (see para. [0040]). The process steps consist of reacting fatty acid glycerides with lower alcohols at a ration of 1:6-60 in the presence of an organometallic catalyst in the range of 0.1 to 10%, the reaction temperature is 60-150°C at 1-10 atm (1.013 to 10.33 bar). (see para. [0020] & [0039]). Also, the concentration of the catalyst used in the process is in the range of 0.1 to 10% (w/w) of the amount of animal fat and/or vegetable oil. (see para. [0040]). The animal fat and/or vegetable oil used as feed stock in Yoo include fatty acids that are saturated or unsaturated. (see para. [0038]). Yoo uses distillation to remove the lower alcohol from the reaction mixture. (see para. [0032] & [0051]). Lastly, the product of Yoo is suitable for use as a biodiesel.

The difference between Yoo and Applicant's claimed process is the following: water washing; purification using an absorbent and treatment temperature and type of

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absorbent; organometallic tin catalyst of dibutyltin oxide or dioctyltin oxide; recycling of excess alcohol, and the viscosity and acid value of the biodiesel produce.

However, Hayafuji et al. discloses a process for producing diesel fuel oil from waste edible oils of vegetable oil that have kinematic viscosity at 30°C of 2.0 mm²/s to 10.0 mm²/s (2cSt to 10cSt). (see column 1, lines 7-16). Additionally, the process of Hayafuji et al. uses solid absorbers to purify the light solution formed by the reaction process, where the light solution is composed of fatty acid alkyl ester. (see column 7, lines 29-38). The absorbent removes impurities such as residual catalyst, odor material and moisture. (see column 5, lines 19 – 25). According to Hayafuji, the use of absorbent to purify the fatty acid alkyl produced by his process, is simple as compared with the process of removing the residual catalyst remaining through cleaning by warm water or by neutralization by acid. (see column 6, lines 19-29). The absorbents used can be selected from activated carbon, activated carbon fiber, activated clay, silica gel, and activated alumina. (see column 15, lines 50-56). The glycerol by-product can be recycled. (see column 4, lines 46-50).

It would have been obvious to one of ordinary skill in the art to at the time of Applicant's claimed process to modify the teaching of Yoo and include an additional purification step that used absorbent as taught by Hayafuji et al., to remove any impurities such as residual catalyst. A motivation for the combination is the desire, as suggested by both references, to produce fatty acid alkyl ester of high purity for use as fuel.

Therefore, the invention as a whole was *prima facie* obvious because a person of ordinary skill in the art at the time the invention was made, would have been motivated to combine the prior art to achieve the claimed invention and that there would have been a reasonable expectation of success.

15. With regard to the tin oxide catalyst such as dibutyl tin oxide and dioctyl tin oxide, Yean et al. discloses that dibutyltin oxide and dioctyltin oxide are useful as catalyst in transesterification reactions. (see page 305, column 2 last paragraph). The fatty acid triglyceride used in Yean was a tripalmitin. Yean et al states that fatty acid methyl esters derived from methanolysis of palm oil have been shown to function as an excellent substitute for diesel fuel. (page 304, column 2, para. 1). Table 1, catalyst 15 and 24, of Yean discloses dibutyltin oxide and dioctyltin oxide catalyst and product composition, with their reaction taking place at 70°C and a pressure of 1 bar. Also, Yean et al. discloses that the reagent methanol was present in excess in the process which shifted the reaction equilibria to the direction of the products, fatty acid alkyl esters. (see page 309, column 2, last para.) Additionally, Ciaudelli discloses an esterification process that uses dibutyltin oxide as the catalyst. Therefore, based on the teaching of Yean et al. and Ciaudelli, it was known at the time of Applicant's claimed process that organometallic catalyst of tin were useful in esterification and transesterification reactions.

Applicant's claimed invention states in their process for preparing fatty acid alkyl esters, esterification and transesterification occur simultaneously, in the process of Yoo without specifically making this designation, simultaneous esterification and

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transesterification are a natural occurrences based on the fact that Yoo's process uses natural oils and fats which contain both fatty acid glycerides and fatty acids. Additionally Yoo uses metal oxide catalyst that contains tin. Further, the teachings of Yean et al. and Ciaudelli disclose that tin oxide catalyst, such as dibutyltin oxide can function both as esterification catalyst and transesterification catalyst. Hayafuji is a process for preparing fatty acid alkyl esters, of high purity, for use as a vegetable diesel fuel, which purifies the fatty acid alkyl ester product of the reaction by using solid absorbent. The only differences between the claimed invention and the references are the combination and order of the "old refining steps for the spent methanol and crude methyl ester" in the processing sequence. It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to prepare a biodiesel as suggested by Yoo using the catalyst taught by Yean et al. and Ciaudelli; and then purify the fatty acid alkyl product with absorbent as suggested by Hayafuji et al. to produce a highly purified fatty acid alkyl ester useful for biodiesel fuel.

Therefore, all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, 82 USPQ2d 1385 (U.S. 2007).

16. The remaining differences between the claimed invention and the prior, such as; the acid value of the biodiesel obtained, appear to be well within the purview of an

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ordinary artisan. This limitation is deemed to be obvious absent a showing of unexpected results.

A reference is good not only for what it teaches by direct anticipation but also for what one of ordinary skill in the art might reasonably infer from the teachings. (*In re Opprecht* 12 USPQ 2d 1235, 1236 (Fed Cir. 1989); *In re Bode* 193 USPQ 12 (CCPA) 1976). In light of the forgoing discussion, the Examiner concludes that the subject matter defined by the instant claims would have been obvious within the meaning of 35USC 103(a). From the teachings of the references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole was *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YATE' K. CUTLIFF whose telephone number is (571)272-9067. The examiner can normally be reached on M-TH 8:30 a.m. - 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel M. Sullivan can be reached on (571) 272 - 0779. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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